IMPACT OF AN INTERVENTION PROGRAM ON MINORITY MEDICAL STUDENTS' NATIONAL BOARD PART I PERFORMANCE

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An intervention program employing test-skills instruction and cooperative learning methods was presented to second-year minority medical students at a major state-supported medical school. The purpose was to enhance minority students' passing rate on Part I of the National Board of Medical Examiners examination. Nineteen of the 21 second-year minority students participated in the program. After the program had been conducted, it was observed that the passing rate of the minority students during that year significantly surpassed the rate of minority students from the previous year. Participants' passing rate approached the passing rate of the nonminority students in the class. Moreover, the mean National Board Examination score for the students participating in the program was not statistically different from that observed for an equal number of randomly selected second-year nonminority students. The results of the program were encouraging; further examination of the effects of support-intervention efforts on minority and nonminority medical students' performance are suggested.

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Performance on the National Board Examination (NBE) is used at many US medical schools as a guideline for academic promotions, graduation requirements, and rating students against national norms.[1] For a number of medical students, the NBE, especially Part I, represents a major hurdle. It is an especially formidable barrier for minority students. The anticipated failure rate for all students taking the NBE Part I for licensure is 10 to 13 percent[2]; the failure rate for minority students taking the examination for the first time often exceeds this range. A study by Rolph and colleagues[3] pointed out the significant performance discrepancy between minority and nonminority students. They reported that the mean NBE Part I score for minority students attending ten predominantly white medical schools was 76 points below that of nonminority students. Moreover, Rolph et al found that even when minority and nonminority students have equivalent preadmission characteristics, the predicted scores of minority students were at least 22 points lower on Part I and at least 36 points lower on Part II.

The problems minority students face regarding Part I of the NBE have concerned administrators at many medical schools. Unfortunately, there have been few successful, documented attempts to address these problems. Further, some of the difficulties associated with students' poor performance on tests may be related more to inadequate test-taking skills than to a lack of knowledge.[4-7]

Inadequate test-taking skills, particularly when applied to multiple-choice examinations like the NBE, may lead to misinterpreting item statements, misreading item statements or options, inappropriate pacing (ie, progressing too quickly through the examination or spending too much time on single items), lacking confidence regardless of preparation, mental and physical fatigue, being intimidated or threatened by tests, lack or loss of concentration, and a general lack of sound test-taking behavior. These factors, alone or in combination, lead to repressed test scores. Moreover, minority students face problems compounded by educational and other experiences that may inhibit successful performance on norm-referenced, standardized, multiple-choice tests.[8]

To address performance problems, several approaches could be employed. One common method is for students to enroll in commercial courses,[9] although the costs of such courses may be prohibitive. A second approach focuses on the teaching of effective test-taking skills.[10] A third method encourages students to establish learning-support groups to reinforce, develop, and expand levels of knowledge.[11-14] A fourth approach combines test-taking skills instruction with learning-support group participation. The fourth approach was used in this study.

A combination of instruction in test-taking skills and provision of a learning-support group was applied at a major state-supported medical school as a special program focusing on minority students. The school had expressed concern over the comparatively poor performance of minority students on previous NBE Part I examinations. The program, conducted through the school's Office of Minority Affairs, was directed at enhancing the performance of minority students (hereafter, the target group) on NBE Part I.

The purpose of this study was to evaluate the program's impact. Three questions were addressed regarding the program:

1. Can the effects associated with intervention reduce disparities between minority participants' and nonminority nonparticipants' NBE Part I performances?
2. Can the effects associated with intervention reduce disparities between minority and nonminority students' passing rates on the NBE Part I?
3. Can the effects associated with intervention produce a higher passing rate for minority students when compared with the performance of minority students in the previous year?

METHODS

Design

To answer the questions the study addressed, three comparisons were made using the NBE Part I performance: (1) comparison of the participants' mean scores with a random sample of second-year nontarget (nonminority) group students; (2) comparison of participants' success (passing vs failing) rate with that of a random sample of nonminority students; and (3) comparison of the participants' success rate with minority students' performance from the previous year.

In addition, to examine the intervention program's impact on the performance of all second-year minority students, two other comparisons were made. The 21 target-group students' NBE Part I success rate was compared with the success rate of the 25-second-year minority students from the previous year. Also, the target group's NBE Part I success rate was compared with the rate of the 104 second-year nonminority students. These two comparisons were for evaluative purposes and for gaining a picture of the program's blanket effect on minority students during the year that the intervention program was in operation.

Sample Program Participants

The target group consisted of 21 minority (15 men and 6 women: 12 Hispanics, 6 blacks, 1 Native American, and 2 Asian-Americans) second-year medical students who were scheduled to take the NBE Part I for the first time. Of the target group, 19 (14 men and 5 women: 11 Hispanics, 5 blacks, 1 Native American, and 2 Asian-Americans) students chose to participate in the program. Those students' NBE performance was compared with that of a randomly selected sample of 19 nonminority (14 men and 5 women) second-year students who did not participate in the program. For additional evaluation purposes, data from all 21 students were examined as well as data from the 25 second-year minority students (19 men and 6 women: 17 Hispanics, 3 blacks, 2 Native Ameri-

cans, and 3 Asian-Americans) from the previous class.

Program Procedures

The intervention program consisted of two components: (1) teaching an effective approach to taking multiple-choice examinations, specifically the NBE; and (2) introducing the use of learning-support groups. The objective was to provide the students with an approach for demonstrating acquired knowledge and reducing test anxiety.

The 19 participating students met for formal program activities on three separate days for a total of 15 hours. Nine hours of instruction were devoted to teaching and reinforcing effective test-taking approaches, and six hours were used for building and maintaining learning-support groups. The three sessions were presented in two parts. The first part spanned one and one-half days (nine hours). The full day (six hours) involved test-taking skills instruction. The following half-day (three hours) consisted of establishing learning-support groups. The second part consisted of a full-day session, two months following the initial sessions, that attempted to reinforce both effective test-taking methods and the use of the learning-support groups.

The topics emphasized during test-taking instruction were the following: testing and measurement principles related to standardized examinations; conversion of raw scores to standard scores and the associated implications for norm-referenced examinations; the form and construction of the various item types found on the NBE Part I; the application of effective techniques for each item type; a systematic approach for completing lengthy examinations; demonstrating the importance of accuracy and concentration; the role of attitude; the use of guessing strategies; and the importance of practice in acquiring effective test-taking skills.

Participants worked through a series of practice examination items to try out suggested test-taking techniques. Correct answers were always given immediately after each practice test. (An exception was the first practice test; each item had been attempted simultaneously and in sequence by all participants on a group basis. Correct answers were then provided immediately after each item was attempted.)

The purpose of the above procedure— combining instruction and practice—was to introduce the participants to effective test-taking modes and to allow them to practice the suggested procedures. Whereas the didactic instructions involved cognitive encoding of information, the practice allowed participants to incorporate the actual process in their test-taking behavior.

The establishment of cooperative learning groups was an important feature of the intervention program. The learning-support group activities encouraged participants to form small groups that provided social and emotional support. These groups enhanced learning, facilitated content review, reinforced acquired test-taking skills, and expedited preparation for the NBE Part I. Participants were shown the benefits of sharing knowledge within peer groups and were given ways to facilitate the process by using practice or self-assessment tests. (Practice tests reinforced test-taking skills and assisted in identifying weak areas of content knowledge.) The participants agreed to form small, self-selected groups (5 to 7 people in each), that would remain intact up to the administration of the NBE.

After the groups were formed, an exercise called for the participants to employ consensus methods in selecting answers on practice tests. The importance of listening carefully to group members who demonstrated knowledge in various content areas was emphasized. The exercise involved the participants in taking practice tests individually and then assembling into their groups to answer each test item by consensus. Both individual and group scores were recorded. Group scores higher than the highest individual score were consistently achieved. Groups achieved the higher scores by discussing each item and willingly sharing related information and also, whenever appropriate, discussing the use of various test-taking techniques. Thus, the recognition and use of peers as a significant learning resource was also a major goal of this segment. Discussion of the use of groups in learning and test preparation, the formation of groups, and accompanying group exercises covered six hours.

In summary, instructional contact with the participants covered three sessions totaling two and one-half days. The first two sessions consisted of six hours of test-taking instructions and three hours of building learning-support groups. A

three-hour session focusing on the preformed support groups occurred after a two-month interim.

A final session was conducted by a member of the Office of Minority Affairs. This session, held just prior to the official administration of the NBE, consisted of the administration of a lengthy (218 items), timed, simulated NBE Part I subtest. Correct answers were provided after the participants completed the test in the prescribed time limit (two and a half hours—approximately 40 seconds per question). One objective of the final session was to provide the students with a practice session under time pressure using a long subtest with items similar to those encountered in the NBE. Other objectives were to allow final sharpening of test-taking skills; reinforce confidence in levels of knowledge; and assure students that they can complete the NBE within the required time limits.

RESULTS

First, to ascertain whether the effects associated with intervention could reduce disparities between minority and nonminority students, the 19 target group participants were compared with 19 randomly selected nonminority students from the second-year class. The mean NBE Part I scores for the target group and the nontarget group sample are shown in Table 1. The *t* test showed the difference between the means to be insignificant.

Second, the participants' passing rate was compared with that of the randomly selected group of nonminority students. (The overall passing rate is defined as the percentage of students who recorded a total score of 380 or better on Part I on the initial attempt.) The passing rates of the target group and the nontarget group were 79 percent and 89 percent, respectively. In comparing the overall passing rates of the participants and nonminority students, the test for significance of difference between two proportions was applied. As shown in Table 2, the participants' NBE passing rate did not differ statistically from that of the nonminority sample.

Third, to learn whether the participants' passing rate on Part I differed significantly from that of minority students in the previous year's class, the test for significance of difference between two proportions was again employed. The passing rate for the 25 minority students from the previous year was 52 percent compared with the participants' 79 percent. As shown in Table 3, success rates differed markedly; the group receiving intervention had a significantly higher proportion of passing scores.

To determine whether during the year the program was conducted the success rate of *all* second-year minority students differed significantly from that of the minority students in the previous year, all 21 students were included and compared with the previous year's 25. The Part I success rate of the 21 students was 81 percent vs 52 percent for those in the previous year. The test for significance of difference between two proportions showed the difference between the two passing rates to be significant ($z = 2.073$, $P < .05$).

Finally, to examine further the program's overall impact on minority students' level of success on Part I, the 21 students' passing rate was compared with that of the 104 nonminority students in the class. The passing rates of 92 percent and 81 percent for the nonminority and minority students, respectively, did not differ significantly ($z = 1.556$, $P > .05$).

DISCUSSION

The major questions addressed by the study were answered affirmatively. The results indicated that the intervention procedure can reduce the disparities between minority and nonminority students on both scores and passing rates for the NBE. The results also showed that minority medical students who had received the intervention had significantly higher passing rates than minority students in the previous class who had not received the same treatment. The impact of intervention was substantial in both increasing the passing rate for minority students over the previous year and reducing the passing rate gap between minority and nonminority students.

The findings and related procedures have promising implications. The results suggest that a combination of instruction in test taking methods and participation in small learning-support groups can enhance performance for minority medical students and, it is likely, all students in general. The

TABLE 1. *t*-TEST COMPARING TARGET GROUP PARTICIPANTS AND A NONTARGET GROUP SAMPLE ON NATIONAL BOARD PART I PERFORMANCE

Group	n	Mean	SD	*t*
Participants	19	451.842	75.521	1.547 (NS)
Nontarget Sample	19	490.579	78.795	

TABLE 2. COMPARING NATIONAL BOARDS PART I PASSING RATES BETWEEN PARTICIPANTS AND NONMINORITY STUDENTS

Group	n	Proportion of Success	z
Participants	19	.79	0.839 (NS)
Nontarget Sample	19	.89	

TABLE 3. COMPARING NATIONAL BOARDS PART I PASSING RATES BETWEEN PARTICIPANTS AND MINORITY STUDENTS FROM THE PREVIOUS YEAR

Group	n	Proportion of Success	z
Participants	19	.79	1.858*
Previous Year Minority Students	25	.52	

*$P < .05$

findings suggest that effective academic-support programs can and should be established for medical and other advanced-level students.

With evidence indicating that effective intervention programs can be mounted for medical school students, more effort should be made to address academic performance problems found in students at the graduate professional school level. The development and expansion of academic support programs in rigorously demanding academic environments would provide a substantial service to many students. Assisting students in becoming more effective learners and in applying what they have learned (as measured by evaluative tests) may often make the difference between success and failure. Conducive educational environments should, of course, provide recognizable support for students. Within a conducive educational environment students should not, for example, be penalized for lacking appropriate test-taking knowledge or skills that inhibit accurate demonstrations of knowledge on examinations. Sound instruction in effective test-taking can address those problems. A program can place emphasis on self-directing, self-assessing, active instead of passive participation. Cooperative learning groups, on the other hand, can address problems related to both learning and successful coping with demanding environments. Consequently, more positive perceptions of the academic environment can occur when students establish their own collegial support systems.

Although the results were encouraging, replications under experimental conditions would be illuminative. For example, attempts to examine the discrete effects of test-taking skills instruction and cooperative learning procedures on performance might provide useful information on the separate effects of both approaches. Also, in other studies the use of randomly selected treatment and control groups (not possible in this study because of the nature of the project) would provide further validity if similar results were found. Another approach would be an examination of the effects of analogous interventive procedures on nonminority students. The supposition is that similar results will be found. Any additional research and development regarding other interventive modes are strongly encouraged.

The primary problem addressed in this study, ie, enhancing performance, is of profound importance in the area of student development. Measures to counteract some of the problems related to performance of students in advanced professional education programs are available. The critical question, however, is whether appropriate opportunities will be provided for facilitating students' academic success.

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